

extreme form in which the two lateral lobes are reduced to large teeth, so that the leaves appear undivided and only coarsely dentate and are then ovate to ovate-oblong in shape. To this form belong the following two specimens: FLORIDA, *Chapman* (herb. Gray) and MISSISSIPPI, *Enterprise* May 6, 1880 (herb. Arnold Arboretum). Considering the sporadic distribution of the variety *tridens* through the range of the species and the inconstancy of its characters as is clearly shown by a large number of specimens, one cannot consent to its elevation to specific rank, as was done by Pax, who in his earlier monograph distinguished even two species, *A. microphyllum* with smaller leaves very glaucous beneath and with the petiole shorter than the limb and *A. semiorbiculatum* with larger leaves, green (!) beneath and with the petiole longer than the limb, each species based apparently on a single specimen, collected by Kinn in "Am. bor." without indication of the locality. In his later monograph he reduces the latter species to a form of *A. rubrum* and substitutes for *A. microphyllum* the name *A. tomentosum*.

ARNOLD ARBORETUM.

THE FLORA OF THE GREAT SWAMP OF RHODE ISLAND.

ERNEST SHAW REYNOLDS.

THE Great Swamp of Rhode Island is a region which has long been recognized by botanists as offering a very rich collecting ground, and has often been visited by students of botany. The swamp is located in the southern part of the state, in Washington County, close to the junction of the town lines of Charlestown, Richmond, and South Kingstown. The larger part lies in South Kingstown, though a part of the western half is in the adjoining town of Richmond. It is entirely enclosed between the parallels $41^{\circ} 25'$ and $41^{\circ} 30'$ while the meridian $71^{\circ} 35'$ cuts the swamp area into two nearly equal portions. Excluding the part south of Worden's Pond, the swamp area covers about six square miles, which is the largest tract of land in Rhode Island bearing a swamp flora.

There are, in Washington County, at least fifty large and small swamps, and many more lakes and ponds. A large number of these are located in the glacial drift, which covers large areas in the state, and their origin can undoubtedly be traced to the glacial period. The topographical features surrounding the Great Swamp are especially favorable to the development of a swamp. West and northwest of the region, the land is well elevated above the level of Narragansett Bay, and the soil, Gloucester stony loam,¹ is porous and easily drained. The soil north and east of the swamp is of glacial origin and the land also well elevated. To the south there is a combination of soils, some of glacial origin, and some derived from the country rock. The elevations here are not so marked as on the other sides. The swamp itself, therefore, is in a basin at least a hundred feet lower than the surrounding country, and often more. Within the Great Swamp area there are two hills, a little over one hundred and fifty feet in height, which partly traverse the swamp in a north and south direction, thus offering a ready means of entering the area. On the southern edge is Worden's Pond ninety four feet above sea level and at no point more than a few feet deep. Its total length is not over two miles, and it is a little less than a mile and a quarter wide. Passing through the swamp, and entering the pond from the north are two streams, the larger called the Chipuxet River. Cutting the western half into two nearly equal divisions and serving as a boundary between the towns of South Kingstown and Richmond, is the Usquepaugh River, which eventually empties into the Pawcatuck River. Swampy land extends on both sides of these rivers for a mile and a half north of the Great Swamp proper.

The records of former botanical work done in this area are rather scattered and difficult to obtain. The most valuable data of course, are from the collections of Olney and Bennett which are largely in the Brown University Herbarium. Besides these there are scattered specimens from the collections of George Hunt, W. W. Bailey, J. W. Congdon and George A. Leland, all of whom have made trips into the swamp at rare intervals. There is no systematic record so far as known to me, of the flora of the Great Swamp region, and only occasional reference is made to it in Bennett's list of Rhode Island Plants, when he includes it in his reference to "South Kingstown." In two of Mr.

¹ See *Soil Survey of R. I.* by F. E. Bonsteel and E. P. Carr, Washington, 1905.

Olney's field note-books which are now in the possession of the Brown University Herbarium, there are notes of three trips into the swamp. These are recorded as occurring in 1846 and 1847. Without doubt other trips were made, but no more records were found. There are none of Mr. Bennett's notes accessible except his list already mentioned. In a letter recently received from the Hon. J. W. Congdon of Seattle, Washington, who formerly collected extensively in the swamp region, there are some interesting notes of his recollections of the area. Most of the plants he mentions were collected also by the writer last summer. He speaks of the relative abundance of *Habenaria ciliaris* and *H. blephariglottis* as well as of *Gaylussacia dumosa*. Besides these he gives a list of the *Utricularias* he has found there, namely *Utricularia biflora*, *clandestina*, *gibba*, *cornuta*, *resupinata*, and *subulata*. Growing in the muddy part of Worden's Pond were *Orontium aquaticum*, *Lachnanthes capitata*, *Xyris caroliniana*, *Sabbatia chloroides*, *Lobelia Dortmanna*, *Juncus militaris*, *Rhynchospora macrostachya*, and *R. fusca*. Mr. Leland has also kindly furnished me with a list of a few plants which he has from that area:— *Linum usitatissimum*, *Utricularia intermedia*, *U. inflata*, *Polygonum acre*, *P. dumetorum* var. *scandens*, *P. Carey*, *P. hydropiperoides*, *Vaccinium pallidum*, and *V. atrococcum*.

During the latter part of August, 1906, the writer was able to make eight trips into the swamp from different directions as briefly indicated below:—

1. The marshy land on the west side of the Chipuxet River about a half a mile south of the Narragansett Pier R. R.
2. The corresponding swamp east of the Chipuxet near Larkin's pond.
3. The swamp between the Shickasheen River and the N. Y. N. H. & H. track, for a couple of miles south of the Kingstown station.
4. A similar region west of the Shickasheen River.
5. The portion of the swamp lying between the two hills already mentioned.
6. A strip of swamp land including the Fighting Ground and south of that to the Shickasheen River.
7. The northeast corner of Worden's Pond, and the swamp near by.
8. Portions of the pond itself and of the eastern shore.

It is difficult to determine the exact distribution of plants in an area

which, like the Great Swamp, is largely at the same level throughout. Thus the one hundred foot contour line marks in general the strictly swampy area, and Worden's Pond, which drains the swamp, is only ninety four feet above sea level, so that there is a dip of less than ten feet from north to south. There are, however, certain features which aid us in the matter. There are at least two important streams which pass through the swamp, the Chipuxet river, and the Shickasheen immediately west of the main railroad. This gives two different types of water areas viz. running and semi-stagnant, which of course merge imperceptibly into one another. A third type includes the two ponds, Worden's and Larkin's, which have a flora different in certain ways from either of the other two types. The temperature of the water was noticeably warmer in the swamp than along the river courses. Certain plants, though included in the swamp area, show a decided tendency to seek the drier portions, such as *Lespedeza frutescens* and *Rhexia Virginica*. The latter of these seemed to grow more luxuriantly, as a rule, in the wetter situations though the individuals were markedly fewer in number than in drier places. On the other hand many plants were decidedly attracted to the free water courses. A few such plants were *Lobelia cardinalis*, *Lycopus Virginicus* and notably *Bidens laevis*. The latter grew so abundantly along the streams of colder water that its dark foliage clearly marked them. The majority of the plants grow between the higher land and the rivers, seeming to prefer the open sunny places. The *Droseras* are in the less soggy parts and grow oftentimes on the dead *Sphagnum*. *Sarracenia purpurea*, *Xyris caroliniana* and *X. flexuosa* as well as a host of others inhabit these localities.

It is an interesting matter to find that, even in this formation, which is usually supposed to be especially favorable to monocotyledonous plants, aside from *Carex* the number of species is only about a third of the total number of Phanerogams found in the swamp. Hence even in the most favorable locations the Monocotyledons are outnumbered more than two to one. A large part of the swamp is heavily wooded. This is especially true of the area included between the Chipuxet River and the easternmost hill already mentioned. Here the deciduous trees predominate, though there are several groves of evergreens also. *Rhododendron maximum* grows in great luxuriance in this portion of the swamp.

In the following list of plants collected in the Great Swamp during

August, 1906, no name has been admitted if an authentic specimen was found in any of the Rhode Island Herbaria examined. Hence only about half of the plants collected are here recorded. A specimen of each species is in the writer's herbarium, and duplicates of the majority are also in the Brown University Herbarium.

PLANTS NOT HITHERTO RECORDED IN THE GREAT SWAMP FLORA.

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|---|--|
| <i>Dryopteris noveboracensis</i> (L.) Gray. | <i>Spiranthes gracilis</i> (Bigel.) Beck. |
| “ <i>simulata</i> Davenp. | <i>Goodyera pubescens</i> (Willd.) R. Br. |
| “ <i>spinulosa</i> (Retz.) Kuntze. | <i>Myrica asplenifolia</i> L. |
| “ <i>Thelypteris</i> (L.) Gray. | <i>Boehmeria cylindrica</i> (L.) Willd. |
| <i>Lycopodium complanatum</i> L. | <i>Polygonum arifolium</i> L. |
| “ <i>lucidulum</i> Michx. | “ <i>pennsylvanicum</i> L. |
| “ <i>obscurum</i> L. | “ <i>Persicaria</i> L. |
| <i>Sparganium americanum</i> Nutt. | “ <i>sagittatum</i> L. |
| <i>Sagittaria Engelmanniana</i> J. G. Smith. | “ <i>punctatum</i> Ell. |
| “ <i>latifolia</i> Willd. | <i>Lychnis alba</i> Mill. |
| <i>Calamagrostis cinnoides</i> (Muhl.) | <i>Spergula arvensis</i> L. |
| Scribn. | <i>Nymphaea odorata</i> Dryand. |
| <i>Glyceria canadensis</i> (Michx.) Trin. | <i>Nuphar advena</i> (Soland.) R. Br. |
| “ <i>obtusata</i> (Muhl.) Kuntze. | <i>Coptis trifolia</i> (L.) Salisb. |
| <i>Dulichium arundinaceum</i> (L.) Britton. | <i>Drosera intermedia</i> Haynes. |
| <i>Eriophorum virginicum</i> L. | “ <i>rotundifolia</i> L. |
| <i>Fimbristylis capillaris</i> (L.) Gray. | <i>Baptisia tinctoria</i> (L.) R. Br. |
| <i>Arisaema triphyllum</i> (L.) Torr. | <i>Medicago sativa</i> L. |
| <i>Xyris flexuosa</i> Muhl. | <i>Trifolium hybridum</i> L. |
| <i>Eriocaulon septangulare</i> L. | <i>Desmodium canadense</i> DC. |
| <i>Pontederia cordata</i> L. | “ <i>ciliare</i> (Muhl.) DC. |
| “ “ var. <i>lancifolia</i> Mo- | “ <i>paniculatum</i> (L.) DC. |
| rong. | “ <i>rigidum</i> DC. |
| <i>Juncus brevicaudatus</i> (Engelm.) Fer- | <i>Lespedeza capitata</i> Michx. |
| nald. | “ <i>frutescens</i> (L.) Britton. |
| <i>Juncus canadensis</i> J. Gay. | <i>Oxalis corniculata</i> L. |
| “ <i>marginatus</i> Rostk. | <i>Polygala Nuttallii</i> T. & G. |
| “ <i>pelocarpus</i> E. Mey. | “ <i>polygama</i> Walt. |
| “ <i>tenuis</i> Willd. var. <i>Williamsii</i> | <i>Euphorbia maculata</i> L. |
| Fernald. | <i>Rhus copallina</i> L. |
| <i>Medeola virginiana</i> L. | <i>Hypericum boreale</i> (Britton) Bicknell. |
| <i>Trillium cernuum</i> L. | “ <i>canadense</i> L. |
| “ <i>undulatum</i> Willd. | “ <i>gentianoides</i> (L.) BSP. |
| <i>Hypoxis erecta</i> L. | “ <i>maculatum</i> Walt. |
| <i>Cypripedium acaule</i> Ait. | “ <i>virginicum</i> L. |
| <i>Habenaria blephariglottis</i> (Willd.) Torr. | <i>Viola pedata</i> L. |
| “ <i>clavellata</i> (Michx.) Spreng. | <i>Chamaenerium angustifolium</i> (L.) |
| “ <i>psycodes</i> (L.) Gray. | Scop. |

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|---|--|
| <i>Oenothera biennis</i> L. | <i>Ilysanthes attenuata</i> (Muhl.) Small. |
| <i>Kneiffia pumila</i> (L.) Spach. | “ <i>gratioloides</i> (L.) Benth. |
| <i>Aralia hispida</i> Vent. | <i>Gerardia paupercula</i> (Gray) Britton. |
| <i>Cicuta bulbifera</i> L. | “ <i>purpurea</i> L. |
| “ <i>maculata</i> L. | <i>Plantago aristata</i> Michx. |
| <i>Sium cicutaefolium</i> Gmel. | <i>Cephalanthus occidentalis</i> L. |
| <i>Cornus Amonum</i> Mill. | <i>Galium asprellum</i> Michx. |
| <i>Clethra alnifolia</i> L. | <i>Viburnum cassinoides</i> L. |
| <i>Chimaphila umbellata</i> (L.) Nutt. | “ <i>dentatum</i> L. |
| “ <i>maculata</i> (L.) Pursh. | <i>Campanula aparinoides</i> Pursh. |
| <i>Rhododendron nudiflorum</i> (L.) Torr. | <i>Lobelia cardinalis</i> L. |
| <i>Kalmia latifolia</i> L. | “ <i>inflata</i> L. |
| <i>Lysimachia quadrifolia</i> L. | <i>Vernonia noveboracensis</i> (L.) Willd. |
| <i>Bartonia virginica</i> (L.) BSP. | <i>Chrysopsis falcata</i> (Pursh) Ell. |
| <i>Asclepias pulchra</i> Ehrh. | <i>Solidago odora</i> Ait. |
| <i>Verbena hastata</i> L. | “ <i>puberula</i> Nutt. |
| <i>Scutellaria lateriflora</i> L. | “ <i>ulignosa</i> Nutt. |
| <i>Brunella vulgaris</i> L. | <i>Anaphalis margaritacea</i> (L.) B. & H. |
| <i>Koellia virginiana</i> (L.) Mac M. | <i>Leontodon autumnale</i> L. |
| <i>Lycopus americanus</i> Muhl. | <i>Hieracium Gronovii</i> L. |
| “ <i>virginicus</i> L. | “ <i>scabrum</i> Michx. |
| <i>Mentha arvensis</i> L. | |

PROVIDENCE, RHODE ISLAND.

THE RETROGRADE COLOR VARIETIES OF GRATIOLA AUREA.

HARLEY HARRIS BARTLETT.

AT Winter Pond in Winchester, Massachusetts, occurs one of the most typical examples of what Blankinship designates in his “Plant-formations of Eastern Massachusetts” as the “Sand-Pond Margin Formation.” Its flora is here unusually well developed, containing in addition to the plants enumerated by Blankinship about twenty others, equally characteristic of the formation. One of these, *Gratiola aurea* Muhl., occupies considerable areas of the low, gravelly shore, frequently to the almost complete exclusion of other plants. It occurs here not only in its typical golden-yellow-flowered form, but also in two well marked color forms the flowers of which are respectively honey-yellow and white.